

DISCUSSION OF THE AMENDMENT

Claims 1-6, 8-9, 11-12, 14-29, 32-37 and 39-40 are active in the present application.

Claims 7, 10, 13, 30-32 and 38 are canceled claims. Independent Claim 1 drawn to a catalytic composition is amended herein to require that the zeolite is zeolite Y. Support for the amendment is found in the previously presented claims, i.e., Claims 7 and 10.

The specification has been amended for matters of form to include a Brief Description of the Drawings.

No new matter is added.

REMARKS

Independent Claim 1 is drawn to a catalytic composition that must contain zeolite Y.

The Office rejected previously presented Claims 7 and 10, which required that the catalytic composition contain zeolite Y, over Girotti (EP0847802). In paragraph no. 9 on page 4 of the October 19 Office Action the Office asserts that “Girotti discloses that the zeolite is selected from zeolite Y, beta, and ZSM-12”. Applicants submit that this is not correct. The cited disclosure of Girotti is reproduced below for convenience:

At present the best results in terms of activity in the alkylation of aromatics with C₂-C₄ olefins, in liquid phase, are obtained by using beta zeolite as alkylation catalyst. EP432.814 described the use of this zeolite for the first time and better results are shown with respect to the zeolites of the prior art ZSM-5, Y and ZSM-12.

See page 3, lines 18-20 of Girotti.

As is evident from the above-quoted text from Girotti, the Office’s assertion that the Girotti composition may be made from zeolite Y and ZSM-12 is not correct. In fact, the above-quoted text of Girotti makes it clear that EP432.814 discloses a different prior art composition, that may include any of ZSM-5, Y and ZSM-12, not the composition of Girotti.

The catalytic composition of Girotti is one that consists of beta zeolite and an inorganic ligand (see the Abstract of Girotti). In fact, Girotti makes it absolutely clear that the Girotti composition is different from the composition of the present claims:

The present invention relates to catalytic compositions consisting of beta zeolite (as such or modified) and a ligand, characterized by particular porosity characteristics, which can be used in processes for the alkylation of aromatic hydrocarbons with light olefins, in particular benzenes with C₂-C₄ olefins and more specifically benzene with ethylene to give ethylbenzene and benzene with propylene to give cumene.

See page 2, lines 3-5 of Girotti.

Contrary to the Office’s assertion that the Girotti compositions may include zeolite Y, the Girotti compositions “consist of” beta zeolite and an inorganic ligand thus excluding

other substances such as zeolite Y. Applicants thus submit that Girotti does not disclose or suggest the catalytic composition of present Claim 1 and actually teaches away from the presently claimed invention by disclosing a composition that excludes zeolite Y.

Not only does Girotti not disclose or suggest the presently claimed invention, Girotti teaches away from the presently claimed invention for other reasons. For example, Girotti discloses materials having porosity characteristics wherein pores having a large diameter are not favored. For example, on page 4, lines 25-26 Girotti discloses:

The porosity in the fraction with a radius which is greater than 450 Å should preferably be less than 0.25 cc/g when the diameter of the catalytic particles is less than or equal to 0.8 mm.

In contrast, the presently claimed invention is drawn to a catalytic composition having porosity characteristics favoring a large pore radius (i.e., “wherein at least 30% of said volume consists of pores with a diameter greater than 100 nanometers” – see Claim 1). Applicants submit that it is readily evident to those of ordinary skill in the art that 100 nanometers is the same as 1,000 Å. Therefore in the presently claimed invention, at least 30% of the pore volume consists of pores having a diameter of greater than 1,000 Å, which is the same as a radius of 500 Å. As noted above, Girotti discloses that large pore radius (e.g., 450 Å is not favored. Therefore, Girotti further teaches away from the presently claimed invention.

Moreover, Girotti makes it clear that the mechanical characteristics of catalyst compositions are compromised when such compositions have a porosity properties characterized by large pore diameter. For example, in the paragraph bridging pages 4 and 5 of Girotti it is disclosed that mechanical characteristics are drastically deteriorated when the EPV (extra zeolite pore volume) is increased. Thus, as already noted above, Girotti teaches away from the presently claimed invention which requires high porosity, e.g., at least 30% of the pore volume consisting of pores with a diameter of greater than 100 nanometers.

The unique qualities of the claimed catalytic composition may be compared with the properties of the Girotti catalyst. Girotti discloses four catalysts, catalyst A, A1, A2 and A3 having extra zeolitic volumes of 0.81, 0.58, 0.23 and 0.40 cc/g with respective crush strengths of 13, 15, 19 and 7 Kg/cm. This may be compared with Example 1 of the present specification which has an extra zeolitic volume of 0.81 cc/g but a crush strength of 21 Kg/cm. Thus, in comparison with the catalyst compositions of Girotti, the catalyst composition of the presently claimed invention has higher crush strength even though a larger pore diameter (e.g., at least 30% of the pore volume consisting of pores having a diameter of greater than 100 Å) is a characteristic of the presently claimed inventive catalytic compositions.

Applicants submit that the catalytic composition of present Claim 1 is therefore patentable over Girotti for all of the reasons explained above in detail. Because Claims 14 and 18 depend from Claim 1, Claims 14 and 18, drawn to a process for making the composition of Claim 1 and a process for transalkylation of aromatic hydrocarbons using the catalytic composition of Claim 1, should also be patentable and allowed over the prior art of record.

Regardless that Claim 14 depends from Claim 1 which should be patentable over the cited prior art, Claim 14 is further patentable over the process disclosed in Girotti at least for the reason that in step a) of Claim 14, the zeolite Y is used in acidic form whereas the process of Girotti is one which uses a beta zeolite in a basic form. For example, Girotti discloses:

In step (a) the beta zeolite used has not undergone any calcination treatment and is therefore in ammonia/alkylammonia form, i.e. it is a beta zeolite in which the original metal cations from the synthesis have been exchanged with ammonium ions, and which still contains the alkylammonium ions used as templating agent for its synthesis.

See page 5, lines 19-21 of Girotti.

In contrast, the process of present Claim 14 explicitly requires that the zeolite Y is in acidic form, i.e., “a) preparing a mixture including zeolite Y in acidic form...”

At least for this reason, the process of Claim 14 is different from the processes disclosed in Girotti and Claim 14 is further patentable over the prior art relied on by the Office.

Further, present Claim 14 recites a particular mixing rate using a high speed mixer at between 900 and 1100 rpm for not less than 50 minutes. In contrast, Girotti does not disclose that the mixing conditions are critical for obtaining an acceptable product. The present specification discloses that using slower mixing speeds provides unsatisfactory catalyst compositions. For example, in Comparative Example 3 of the present specification, mixing is carried out at 45 revolutions per minute to provide a catalyst composition having a relatively low extra zeolitic volume (0.44 cc/g) and pore crush strength (i.e., 14 Kg/cm).

Further still, Girotti does not disclose that particular drying temperatures can have a substantially affect on the properties of the formed catalyst composition. Present Claim 14 provides explicit drying conditions; namely, air calcination including temperatures “not lower than 550°C and not higher than 600°C for a time of not less than 30 hours”. Comparative Example 3 of the present specification uses a drying time of only 24 hours and, as already mentioned above, the resulting catalyst composition has an extra zeolitic volume of only 0.44 cc/g and a crush strength of only 14 Kg/cm. Thus, the particular process conditions recited in the present claims have a significant affect upon the properties of the resulting catalytic compositions, Girotti does not disclose or suggest that such features may be critical or important.

Claim 18 is likewise dependent from independent Claim 1. Claim 18 should be allowed for the reason that the catalyst of Claim 1, from which Claim 18 depends, is not obvious over Girotti.

For the reasons discussed above in detail, Applicants respectfully request the allowance of all now-pending claims.

Respectfully submitted,

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